

CLAIMS

1. In a wireless over-the-air communications system that includes one or more cell sites, an MTSO, locating means in the cellular communications system for determining the exact geographic location of a mobile unit and for providing a position signal of said exact geographic location, means in the MTSO for recognizing the position signal and using that position signal to establish the exact geographic location of the mobile unit, and data means in the MTSO for defining billing information for said mobile unit based on the exact geographic location of the mobile unit, said data means including tables containing billing information and positional data and means for comparing the exact geographic location of said mobile unit to the tables and assessing charges to said mobile unit based on said exact geographic location and for generating a communication process record for billing purposes, the improvement in combination therewith comprising:

means in said data means for providing billing information based on the location of the mobile unit when a communication process is originated.

2. The improvement defined in Claim 1 wherein the means in said data means further includes means for updating billing information as the mobile unit moves during a communication process.

3. The improvement defined in Claim 1 wherein the means in said

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data means further includes means for providing billing information for the mobile unit according to where service is provided so that more than one cellular communications system can share the revenue associated with a communication process.

4. The improvement defined in Claim 3 wherein the means for providing billing information according to where service is provided includes means for updating billing information as the mobile unit moves during a communication process.

5. The improvement defined in Claim 1 wherein the data means includes means for accepting the communication process if the mobile unit is within a prescribed geographic area.

6. The improvement defined in Claim 1 wherein the data means includes means for rejecting the communication process if the mobile unit is outside the prescribed geographic area.

7. A wireless over-the-air communications system that includes one or more cell sites, an MTSO, locating means in the cellular communications system for determining the exact geographic location of a mobile unit and for providing a position signal of said exact geographic location, means in the MTSO for recognizing the position signal and using that position signal to establish the exact geographic location of the mobile unit, and data means in the MTSO responsive to the locating means for altering a frequency used for the communication process based on the exact

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geographic location of the mobile unit, said means for altering communication process frequency including tables containing authorized frequencies for the cellular communication system and positional data and means for comparing the exact geographic location of said mobile unit to the tables and selecting a frequency to use for the communication process made by said mobile unit based on said exact geographic location.

8. The wireless over-the-air communications system defined in Claim 7 wherein said data means further includes means for generating billing information based on geographic location of the mobile unit.

9. A wireless over-the-air communications system that includes one or more cell sites, an MTSO, locating means in the cellular communications system for determining the exact geographic location of a mobile unit and for providing a position signal of said exact geographic location, means in the MTSO for recognizing the position signal and using that position signal to establish the exact geographic location of the mobile unit, and data means in the MTSO responsive to the locating means for directing a communication process to a specific cell site based on the exact geographic location of the mobile unit, said data means including tables containing positional data for service boundaries and means for comparing the exact geographic location of said mobile unit to the tables and selecting a specific cell site to handle the communication process based on said exact geographic location

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of the mobile unit.

- 2.10. The wireless over-the-air communications system defined in Claim 1 wherein said data means includes means for generating a communication process record for each communication process.

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11. The wireless over-the-air communications system defined in Claim 9 wherein said data means includes means for redirecting a communication process to a second cell site.

- 4.12. The wireless over-the-air communications system defined in Claim 9 wherein said data means further includes means for redirecting a communication process to another cellular system.

- 5.13. The wireless over-the-air communications system defined in Claim 9 wherein said data means further includes means for altering the frequency of a communication process during the communication process.

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14. The wireless over-the-air communications system defined in Claim 1 wherein said data means further includes means for changing the cell site during the communication process.

15. The wireless over-the-air communications system defined in Claim 14 wherein said data means further includes means for changing wireless over-the-air communication systems during the communication process.

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16. In a wireless over-the-air communications system that includes one or more intra-system cell sites, a system boundary and an MTSO, the wireless over-the-air communications system being located adjacent to at least one neighboring wireless over-the-air wireless communication system having its own cell sites which are inter-system cell sites with respect to the wireless over-the-air communications system, the wireless over-the-air communications system being authorized to provide service to communication processes handled by the intra-system cell sites, the wireless over-the-air communications system and the neighboring wireless over-the-air carrier being subject to inter-system interference, locating means in a mobile unit of a wireless over-the-air communications system for determining the exact geographic location of the mobile unit and for providing a position signal of said exact geographic location; means in the MTSO for recognizing the position signal transmitted by the mobile unit and using that position signal to establish the exact geographic location of the mobile unit vis à vis cell sites in the wireless over-the-air communications system; and data storage and comparison means in the MTSO storing intra-system cell site location data giving a geographic location for each of the intra-system cell sites in the wireless over-the-air communications system and effecting a comparison between said position signal and the cell site location data of the intra-system cell sites and selecting a chosen cell site for use by said mobile unit based on said comparison and establishing communication between said mobile unit and said chosen cell site based on the exact

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geographic location of the mobile unit if said chosen cell site is an intra-system cell site for reducing interference between said wireless over-the-air communications system and a neighboring wireless over-the-air carrier, the improvement in combination therewith comprising:

means in said data storage and comparison means for providing billing information based on the location of the mobile unit when a communication process is originated.

17. The wireless over-the-air communications system defined in Claim 16 wherein the means in said data storage and comparison means further including means for updating billing information as the mobile unit moves during a communication process.

18. The wireless over-the-air communications system defined in Claim 16 wherein the means in said data storage and comparison means further including means for providing billing information for the mobile unit according to where service is provided.

19. The wireless over-the-air communications system defined in Claim 16 wherein the locating means includes a satellite communications system.

20. The wireless over-the-air communications system defined in Claim 16 wherein the means in said data storage and comparison means further includes means for changing the frequency of the communication process during the communication process.

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21. A method of making communication process management decisions in a wireless over-the-air communications system having a plurality of cell sites at various locations and an MTSO including:

- A) establishing an exact geographic location for a mobile unit;
- B) matching the geographic location of the mobile unit to service boundary information, and selecting a cell site based on such matching;
- C) using the selected cell site matched to the mobile unit to handle communication processes associated with the mobile unit; and
- D) using the geographic location of the mobile unit for billing.

22. The method defined in Claim ⁶⁸₁ 21 wherein the step of using the geographic location of the mobile unit for billing includes changing the billing rates during the communication process.

23. A method of making communication process management decisions in a wireless over-the-air communications system having a plurality of cell sites at various locations and an MTSO comprising:

- A) establishing an exact geographic location for a mobile unit; and
- B) establishing a frequency for use in handling a communication process made by the mobile unit based on the geographic location of the mobile unit.

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24. A method of making communication process management decisions in a wireless over-the-air communications system having a plurality of cell sites at various locations and an MTSO comprising:

A) establishing an exact geographic location for a mobile unit making a communication process;

B) establishing a billing record upon which taxes can be assessed based on the location of the mobile unit when the communication process originated.

25. The method defined in Claim 24 further including updating the billing records for updating tax assessment as the mobile unit moves during the communication process.

26. A method of making communication process management decisions in a wireless over-the-air communications system having a plurality of cell sites at various locations and an MTSO comprising:

A) establishing an exact geographic location for a mobile unit;

B) establishing override criteria which directs communication processes away from a specific cell site; and

C) directing the communication process to the specific cell site, and then re-directing the communication process away from that specific cell site based on the override criteria.

27. A method of making communication process management decisions in two wireless over-the-air communications systems each of which has a plurality of cell sites at geographic locations and an MTSO

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comprising:

- A) establishing an exact geographic location for a mobile unit;
- B) matching the geographic location of the mobile unit to a service boundary information, and selecting a cell site based on such matching;
- C) using the selected cell site to handle communication processes associated with the mobile unit;
- D) using the geographic location of the mobile unit for billing;
- E) directing the billing to the appropriate wireless over-the-air communications system authorized to handle communication processes in the particular geographic location of the mobile unit; and
- F) continuously updating the geographic location of the mobile unit during the communication process whereby each of the cellular systems will bill for any portion of the communication process carried out in its territory regardless of where the communication process originated.

28. A method of making communication process management decisions in two wireless over-the-air communications systems each of which has a plurality of cell sites at various locations and an MTSO comprising:

- A) locating at least one cell site from one of the wireless over-the-air communications systems in the geographic area of the other wireless over-the-air communications system;
- B) establishing an exact geographic location for a mobile unit;

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- C) matching the geographic location of the mobile unit to service boundary information, and selecting a cell site based on such matching;
 - D) using the selected cell site to handle communication processes associated with the mobile unit;
 - E) using the geographic location of the mobile unit for billing;
 - F) directing the billing to the appropriate wireless over-the-air communications system authorized to handle communication processes in the particular geographic location of the mobile unit; and
 - G) continuously updating the geographic location of the mobile unit during the communication process whereby each of the wireless over-the-air communications systems will bill for any portion of the communication process carried out in its territory regardless of where the communication process originated.

29. A method of making communication process management decisions in two wireless over-the-air communications systems comprising:

- A) establishing a shared cell site;
- B) sharing the cell site by both of the wireless over-the-air communications systems;
- C) establishing an exact geographic location for a mobile unit;
- D) matching the geographic location of the mobile unit to service boundary information, and selecting a cell site based on such matching;
- E) using the selected cell site to handle communication

processes associated with the mobile unit;

F) using the geographic location of the mobile unit for billing;

G) directing the billing to the appropriate wireless over-the-air communications system authorized to handle communication processes in the particular geographic location of the mobile unit; and

H) continuously updating the geographic location of the mobile unit during the communication process whereby each of the wireless over-the-air communications systems will bill for any portion of the communication process carried out in its territory regardless of where the communication process originated even if the shared cell site is used.

30. A method of making communication process management decisions in two neighboring wireless over-the-air communications systems each having its own cell sites, comprising:

A) maintaining signal strength in all cell sites at a maximum permissible level for the area immediately adjacent to each cell site;

B) establishing an exact geographic location for a mobile unit;

C) matching the geographic location of the mobile unit to a cell site location, and selecting a cell site based on such matching; and

D) using the selected cell site matched to the mobile unit to handle communication processes associated with the mobile unit.

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the mobile unit.

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~~38.~~ The method defined in Claim ²⁴~~30~~ further including a step of using a satellite to determine the exact geographic location of the mobile unit.

39. The method defined in Claim 24 further including a step of using a satellite to determine the exact geographic location of the mobile unit.

40. The method of making communication process management decisions defined in Claim ⁶⁸~~21~~ further including a step of updating the billing as the mobile unit moves during the communication process.

41. The wireless over-the-air communications system defined in Claim 15 wherein said data means further includes means for changing frequency during the communication process.

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~~42.~~ The improvement defined in Claim ²⁸~~1~~ wherein the cell sites include at least one wireless system communications satellite.

43. The improvement defined in Claim 7 wherein the cell sites include at least one wireless system communications satellite.

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~~44.~~ The wireless over-the-air communications system defined in Claim ¹~~9~~ wherein the cell sites include at least one wireless

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system communications satellite.

45. The wireless over-the-air communications system defined in Claim 16 wherein the cell sites include at least one wireless system communications satellite.

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46. The method defined in Claim 21 wherein the cell sites include at least one wireless system communications satellite.

47. The method defined in Claim 23 wherein the cell sites include at least one wireless system communications satellite.

48. The method defined in Claim 24 wherein the cell sites include at least one wireless system communications satellite.

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49. The method defined in Claim ⁹26 wherein the cell sites include at least one wireless system communications satellite.

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50. The method defined in Claim ¹⁴27 wherein the cell sites include at least one wireless system communications satellite.

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51. The method defined in Claim ¹⁷28 wherein the cell sites include at least one wireless system communications satellite.

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52. The method defined in Claim ²¹29 wherein the cell sites include at least one wireless system communications satellite.

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53. The method defined in Claim ~~30~~ wherein the cell sites include at least one wireless system communications satellite.

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54. The method defined in Claim 2¹ further including a step of updating the exact geographic location of the mobile unit at selected intervals.

55. The method defined in Claim 23 further including a step of updating the exact geographic location of the mobile unit at selected intervals.

56. The method defined in Claim 24 further including a step of updating the exact geographic location of the mobile unit at selected intervals.

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37. The method defined in Claim 26 further including a step of updating the exact geographic location of the mobile unit at selected intervals.

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38. The method defined in Claim 27 further including a step of updating the exact geographic location of the mobile unit at selected intervals.

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59. The method defined in Claim 28 further including a step of updating the exact geographic location of the mobile unit at selected intervals.

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60. The method defined in Claim ²¹~~20~~ further including a step of updating the exact geographic location of the mobile unit at selected intervals.

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61. The method defined in Claim ²⁴~~30~~ further including a step of updating the exact geographic location of the mobile unit at selected intervals.

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62. The improvement defined in Claim ²⁷~~1~~ further including means for updating the location of the mobile unit at selected intervals.

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63. The wireless over-the-air communications system defined in Claim ²⁸~~1~~ further including means for updating the location of the mobile unit at selected intervals.

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64. The wireless over-the-air communications system defined in Claim ¹~~8~~ further including means for updating the location of the mobile unit at selected intervals.

65. The improvement defined in Claim 16 further including means for updating the location of the mobile unit at selected intervals.

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